

TWO NEW SPECIES OF BAGWORM MOTHS FROM VENEZUELA
WITH SPECIAL REMARKS ON REPRODUCTIVE MORPHOLOGY
IN PSYCHIDAE (LEPIDOPTERA: PSYCHIDAE)

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ABSTRACT—The adults and immature stages of *Dendropsyche venezuelae*, n. sp. and the adult male of *Lumacra leucobasilaris*, n. sp., are described from Venezuela and are illustrated. A brief discussion of possible correlations between certain elements in the male and female reproductive systems in Psychidae is also presented.

Intensive collecting within the last few years by Dr. Fernandez-Yepez and his students has resulted in a fine representation of Microlepidoptera from Venezuela, including the two new species of bagworm moths described below. Dr. Fernandez-Yepez has requested a name for one of these to facilitate reporting on certain aspects of its biology. I wish to thank Dr. Fernandez-Yepez and Mr. L. Rodriguez for allowing me to examine this material as well as for their patient efforts in securing more material at my request.

In addition, I have devoted some discussion to the possible correlation of the length of the vesica in the male reproductive system to that of the ductus seminalis in the female. This is discussed under *Dendropsyche venezuelae* because the reproductive morphology of that species apparently contradicts the correlation observed in several other species of Psychidae.

Dendropsyche venezuelae Davis, new species

MALE (fig. 1): Body slender, moderately hairy, uniform brownish color. Antennae with 22–24 segments, broadly bipectinate with terminal 5 or 6 segments strongly serrate to simple; lateral rami (fig. 4) arising from base of each segment; sensory setae very fine, elongate, length approximately 2–4 × the diameter of lateral rami. Legs with epiphysis and tibial spurs absent, light brownish fuscous in color.

Wings uniformly fuscous and rather heavily scaled; wing scales very slender with acute apices. Venation similar to that described for genus (Davis, 1964); forewings 11-veined, hindwings 7-veined; all veins typically separate. Wing expanse 12–15 mm.

Genitalia (fig. 8–9): Elongate and slender. Apex of tegumen evenly rounded. Vinculum elongate, approximately equalling length and width of tegumen. Saccus relatively stout, subequal to vinculum in length. Valvae broad, breadth approximately 0.5 total length of valvae; pulvilli slender, digitate, with 8–10 minute setae at apex; sacculus with 3–4 small, apical spines. Aedeagus slender, long, approximately equalling entire genitalia in length. Furcal arms of eighth sternite (fig. 10) long, approximately 2.5 × length of undivided base. Eighth tergite (fig. 11) relatively large, elongate, similar to *Dendropsyche burrowsi* in form.



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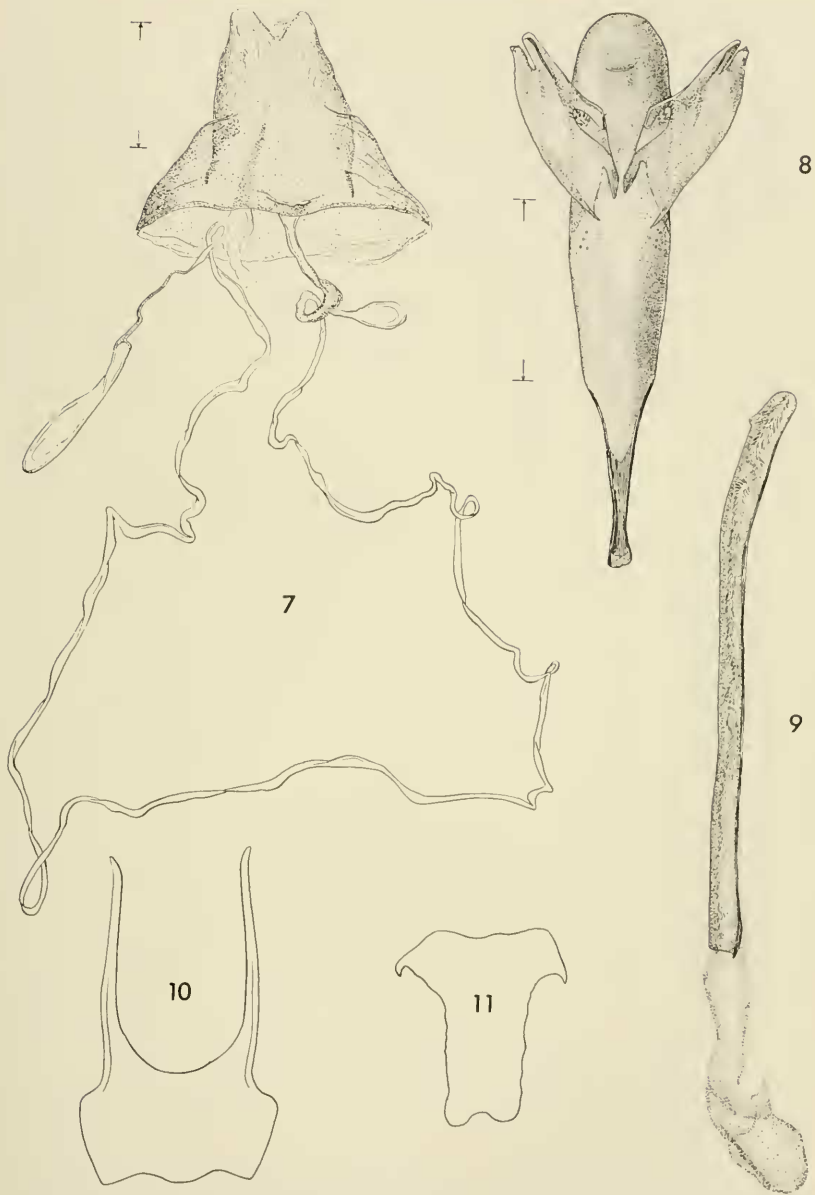
Fig. 1. Adult male of *Dendropsyche venezuelae* n. sp., paratype, wing expanse 14.5 mm. Fig. 2. Adult male of *Lumacra leucobasilaris* n. sp., holotype, wing expanse 28 mm.



Fig. 3. Antenna of *Dendropsyche burrowsi*, holotype. Fig. 4. Antenna of *Dendropsyche venezuelae* n. sp., paratype. Fig. 5. Antenna of *Lumacra leucobasilaris* n. sp., holotype. Fig. 6. Larval case of *Dendropsyche venezuelae* n. sp., length of case (exclusive of pupal exuvium) 13 mm.

FEMALE: Length 7-8 mm. Vermiform. All body appendages vestigial, reduced to minute tubercles, or completely absent. Dorsum of head and thorax lightly sclerotized, brownish; remainder of body naked, whitish except for encirclement of dark brownish hair around seventh segment of abdomen.

Genitalia (fig. 7): External genitalia largely membranous; a single pair of



Figs. 7-11. *Dendropsyche venezuelae* n. sp. 7, female genitalia, scale = 0.5 mm. 8, male genitalia. 9, aedeagus of male. 10, eighth abdominal sternite of male. 11, eighth abdominal tergite of male. Scale of figs. 8-11 = 0.5 mm.

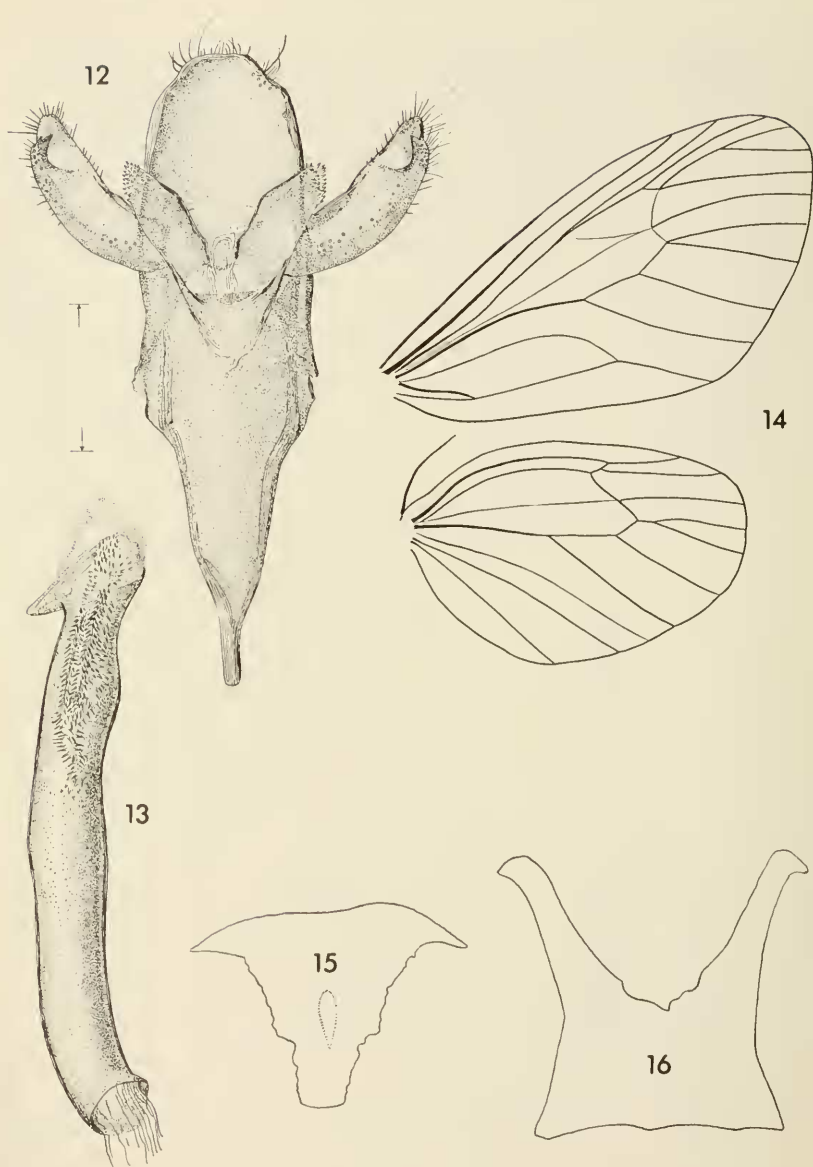


Fig. 12-16. *Lumacra leucobasilaris* n. sp. 12, male genitalia. 13, aedeagus of male. 14, wing venation. 15, eighth abdominal tergite of male. 16, eighth abdominal sternite of male. Scale of Figs. 12-13, 15-16 = 0.5 mm.

short, posterior apophyses extending from about level of ostium and gradually coalescing with walls of terminal (9 & 10) segment; anterior apophyses of eighth segment indistinct. Internal genitalia with extremely long, convoluted ductus seminalis extending to junction of spermatheca; bursa copulatrix reduced, smaller in size than relatively elongate spermatheca.

LARVA (fig. 17-23): Length of largest larva 11 mm.

Head: Light tan with four irregular, fuscous, longitudinal bands along each side of head; subdorsal band the most irregular, typically broken into a series of variable spots; a slightly paler, inverted V-shaped band extending down over adfrontal and frontal sclerites. Six ocelli present, arranged in an inverted L-shaped series. O2 situated between fifth and sixth ocelli; O3 arising more posterior and ventral and situated caudad of sixth ocellus. P2 absent. AFa situated somewhat intermediate between AF1 and AF2 but closer to latter. Labrum with M1 and M3 well separated from outer margin; all other setae closely bordering margin.

Thorax: Pronotum light tan with dark brown V-shaped bands on either side of dorsal median and two pairs of irregular dark brown bands situated laterally; maculation of meso- and metanota similar except bands usually shorter and broader. L1, L2, and L3 situated with spiracle on pronotal shield; L series situated on a separate pinnaculum on meso- and metathorax. SV1 and SV2 on a separate, partially darkened pinnaculum.

Abdomen: Dorsum of first and second abdominal segments dark brown, becoming somewhat paler caudally. Pinnacula no darker or frequently lighter than remainder of integument, especially along dorsal half. Integument without microtrichia, smooth, except for minute, squamoid thickenings in pigmented areas. D1 and D2 usually on separate pinnacula with D2 situated slightly forward of D1. SD2 minute, separated from pinnacula bearing SD1 except on VII and VIII. Abdominal prolegs III to VI with 20-22 crochets in a uniordinal, lateral penellipse (fig. 22); anal prolegs similar except with 22-24 crochets. SV1, 2 and 3 on same pinnaculum bearing crochets and separated from VI. SV2 absent on segment I but present on II and situated on same pinnaculum as VI (fig. 20). Ninth segment with D2 and SD1 on same pinnaculum. Dorsal anal shield (fig. 21) with cephalic margin deeply excavate at midline.

LARVAL CASE (fig. 6): Dimensions: male, 9-12 mm in length; 2-3 mm in diameter; female, 13-15 mm in length; 3-4 mm in diameter. Exterior of case densely covered with a mat of tiny fragments of plant material; overlying this are usually attached a few large fragments of the same material arranged lengthwise.

MALE PUPA (fig. 24-28): Length 5-6 mm. Dark reddish brown. Frontal area raised slightly to form a low median ridge, or cocoon-cutter (fig. 28). Antennal sheaths extending almost to apices of mesothoracic legs; wings extending to caudal margin of third abdominal segment. Abdominal segments I-II without transverse rows of spines; III-VI each with a dorsal anterior row of stout spines (fig. 24) directed caudad and a posterior row of slender spines (fig. 25) directed cephalad; segments VII and VIII with a single anterior row of stout spines. Tabulation of spines as in Table I.

Cremaster of segment X consisting of a single pair of large, stout hooks (fig. 27) curved cephalad.

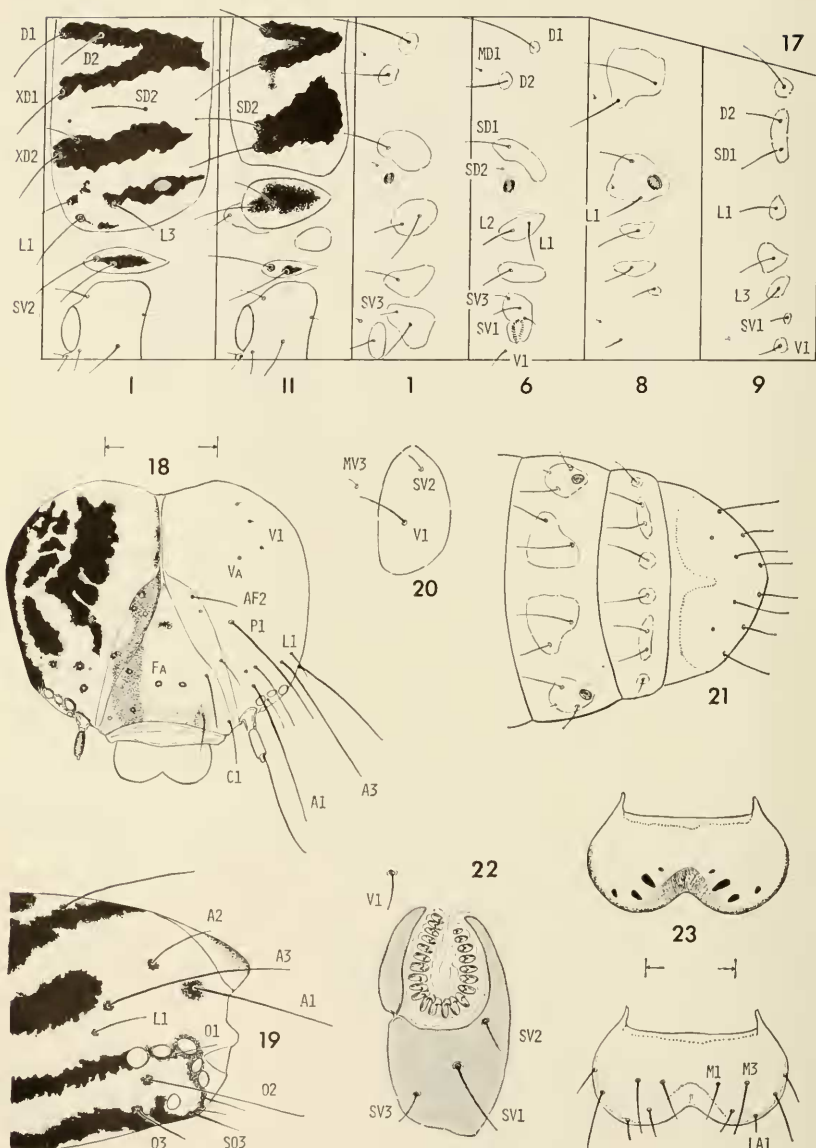


Fig. 17-23. Larvae of *Dendropsyche venezuelae* n. sp. 17, chaetotaxy of prothorax, mesothorax, and abdominal segments 1, 6, 8 and 9. 18, frontal view of head, scale = 0.5 mm. 19, lateral view of head. 20, chaetotaxy of venter of second abdominal segment. 21, dorsal view of abdominal segments 8, 9 and 10. 22, sixth abdominal proleg. 23, ventral (top) and dorsal (bottom) view of labrum, scale = 0.2 mm.

Table 1. Distribution of dorsal abdominal spines of male pupa.

Segment	I	II	III	IV	V	VI	VII	VIII
Anterior row	0	0	8-10	10-13	16-18	16-19	12-14	5-8
Posterior row	0	0	21-25	21-24	20-25	15-17	0	0

FEMALE PUPA (fig. 29): Length 10 mm. Light reddish brown. Pupal antennae, eyes, and maxillae vestigial; wings absent. Legs vestigial, represented by small tubercles. Dorsal row of spines usually smaller than in male, completely absent on first segment; second segment with a single row of stout spines at extreme posterior margin; anterior row of segment III greatly reduced, spines barely discernible. Tabulation of spines summarized in table 2 (1 pupa examined).

Cremaster reduced, consisting of two small stout spines. Anal groove (fig. 29) prominent, Y-shaped with two minute tubercles near anterior end.

HOLOTYPE: El Limon, Aragua, Venezuela, 450 m., ♂, Jan. 20, 1967, adult emerged Jan. 26, 1967, coll. L. Rodriguez, Holotype no. USNM 72078; in the National Museum of Natural History, Washington, D.C.

PARATYPES: Same locality as holotype, adults emerging Jan. 20-May 9: 45 ♂, 6 ♀ (NMNH); 42 ♂, 2 ♀ (UCV). Described from a total of 88 ♂ and 8 ♀ (most with associated pupal exuviae and larval cases) and 10 larvae.

HOST: "Acanthaceae: *Ruellia tuberosa* Linn.; Amaranthaceae: *Amaranthus* sp.," F. Fernandez-Yepez, *in litt.*

PARASITES: Chalcididae: *Spilochalcis* sp., (det. B. Burks). Ichneumonidae: *Chirotica* sp., *Pristomerus* sp., (det. R. Carlson). Tachinidae: *Stomatomyia* sp., near *floridensis* Townsend, (det. C. Sabrosky).

DISTRIBUTION: Known only from the type locality near Maracay in the Cordillera de la Costa of Northern Venezuela.

DISCUSSION: Prior to the discovery of this moth, the only known member of *Dendropsyche* was *D. burrowsi* Jones, which was described from three imperfect males and a very limited amount of immature material. Thus, the large series of reared and associated material which Dr. Fernandez-Yepez and his associates have acquired recently are of great value in gaining more information on this particular genus. The discovery of *D. venezuelae* also suggests the existence of more undescribed neotropical members of this genus.

Table 2. Distribution of dorsal abdominal spines of female pupa.

Segment	I	II	III	IV	V	VI	VII	VIII
Anterior row	0	0	4	8	12	15	20	4
Posterior row	0	23	27	31	23	0	0	0

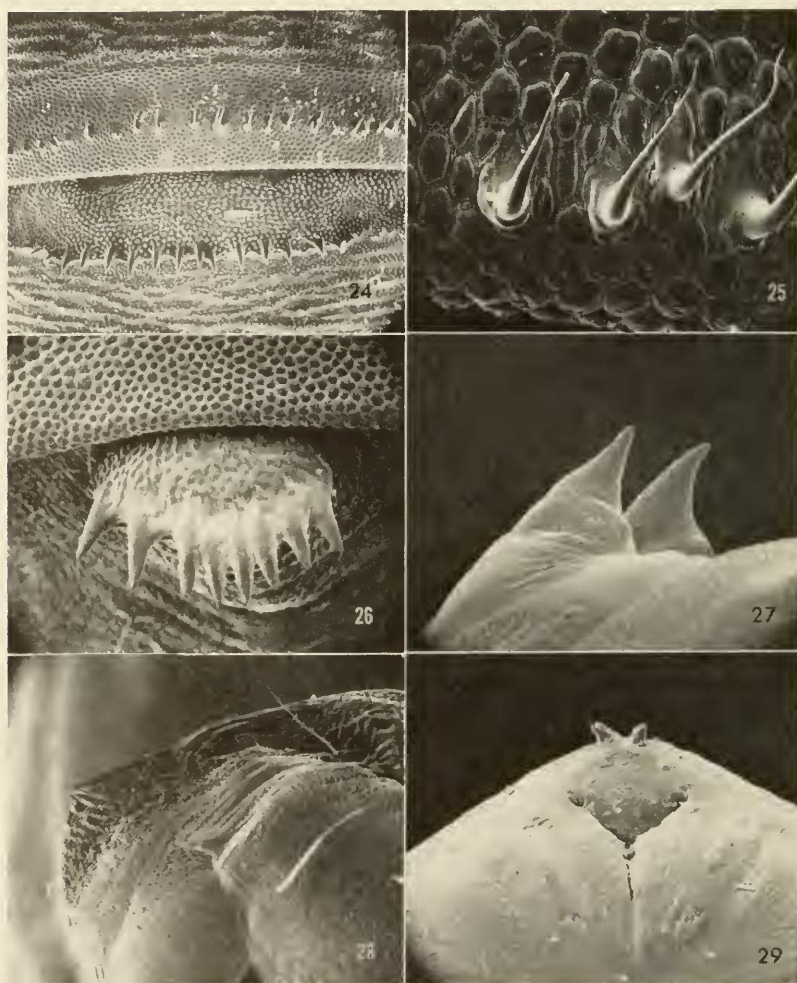


Fig. 24–29. Male and female pupal characters of *Dendropsyche venezuelae*, n. sp. 24, dorsal view of fifth and sixth abdominal segments showing posterior and anterior rows (respectively) of transverse spines (male). 25, detail of posterior row of spines of fifth abdominal segment (male). 26, dorso-caudal view of anterior row of spines on eighth abdominal segment (male). 27, lateral view of cremaster of tenth segment (male). 28, lateral view of cremaster of tenth segment (female). 29, dorsal view of tenth segment (female).

Dendropsyche venezuelae may be distinguished from its only known relative, *D. burrowsi*, most easily by comparing the male genitalia. The vinculum of *D. venezuelae* is considerably longer and the saccus is correspondingly shorter than in *D. burrowsi*. The eighth sternites

also differ in outline, with that of *D. venezuelae* possessing a more truncated anterior margin. The antennal rami of this species also arise more basad than in *D. burrowsi* (Fig. 3).

The larva of *D. venezuelae* may be recognized by the deeply clefted cephalic margin of the anal shield and by the presence of SV2 on the same pinnaculum as VI on the second abdominal segment. The latter character is also a feature of the larva of *Oiketeticus kirbyi* Guilding, and probably of other species of *Oiketeticus*. However, in most species of Psychidae examined to date, seta SV2 is absent from the second abdominal segment.

The male pupa displays no outstanding feature useful for recognition and superficially resembles two undescribed species (not congeneric) from Trinidad. The female pupa is somewhat unusual in lacking the posterior row of dorsal spines from the sixth abdominal segment, thus agreeing with *Cryptothelea surinamensis* and *Oiketeticus kirbyi* in this respect. However, the anterior row of spines is absent from the eighth abdominal segment in the latter two species but present in *D. venezuelae*.

The female reproductive system of this species is most unusual in possessing a greatly lengthened ductus seminalis. Prior to the discovery of *D. venezuelae*, such an extended ductus was known to occur in only two of the most specialized psychid genera, *Oiketeticus* and *Thyridopterix*. Furthermore, I formerly believed that a definite correlation existed between the length of the male vesica (and relative enlargement of the base of the aedeagus) and the length of the ductus seminalis of the female. The reason for this belief being that dissections of two mating pairs of *Thyridopteryx ephemeraeformis*, killed in copulo, showed the vesica of the male to have been forced halfway through the greatly lengthened ductus seminalis of each female, thus bypassing the bursa copulatrix. It is not known how great an effect the manner of death may have had on the final position of the vesica. However, these two observations, although posing some intriguing questions as to the relative function of the bursa copulatrix and spermatheca, did seem to offer an explanation as to why males with the longest vesicae were only known to occur in species where the females possessed the longest ductus seminalis. In order to accommodate the extended vesica in these species, the base of the aedeagus has been correspondingly enlarged.

Thus, I hypothesized that the females of such genera as *Biopsyche* (in which the females are still undiscovered), would possess a greatly lengthened ductus seminalis. Conversely, in no species which the vesica of the male was relatively short (and the aedeagus base unswollen) would the female ductus be lengthened. However, as has been pointed out, the male and female reproductive systems of *D. venezuelae* present a significant and paradoxical exception to all pre-

vious correlations and observations. Because the female of *D. burrowsi* is unknown, no comparison of reproductive systems is possible with the only other member of this genus.

The females of many more species will have to be collected and studied before any clearer understanding concerning the significance in the relative length of the ductus seminalis can be established. Studies involving pairs *in copulo* are especially needed in order to better understand the entire rather peculiar reproductive morphology and copulatory behavior in this family.

Lumacra leucobasilaris Davis, new species

MALE (fig. 2): Body slender, moderately hairy, uniformly fuscous in color, Antennae with 23 segments, broadly bipectinate with only the terminal segment strongly serrate; lateral rami (fig. 5) arising subapically or apically from those segments on outer half of flagellum; sensory setae very fine, elongate, length approximately 3.0–4.0 the diameter of supporting rami. Legs brownish in color; meso- and metathoracic legs without tibial spurs (prothoracic legs missing but probably with a prominent epiphysis).

Forewings fuscous, uniformly scaled, 12-veined (fig. 14) with 8 and 9 (R3 and 4) stalked half their length; 4 and 5 (M2 and 3) connate in the right wing, slightly stalked in the left; base of medial vein not forked within cell; scales of discal cell relatively broad, oblanceolate, with simple, subacute to rounded apices. Hindwings unevenly scaled, outer three-fifths fuscous and covered with oblanceolate scales; basal two-fifths whitish, thinly covered with long, hairlike scales; 8-veined with 4 and 5 (M2 and 3) stalked about one-fifth their length; Sc + R1 and Rs connected by oblique crossvein beyond apex of discal cell. Wing expanse 28 mm.

Genitalia (fig. 12–13): Elongate with apex of tegumen broad and rounded. Vinculum elongate, roughly V-shaped, tapering to form a short, stout saccus; saccus less than one fourth the length of vinculum. Valvae relatively slender with large, prominent pulvilli; apex of pulvilli densely covered with approximately 30 small spines; apex of sacculus sharply bipid. Aedeagus elongate, equalling genitalia in length; base not swollen. Furcal arms of eighth sternite (fig. 16) divergent, slightly exceeding length of undivided base. Eighth tergite roughly triangular (fig. 15).

FEMALE: Unknown.

LARVA: Unknown.

HOLOTYPE: Rancho Grande, Aragua, Venezuela, 1100 m., ♂, May 1, 1966, coll. F. Fernandez-Yepez and J. Salcede, wing slide 16145, ♂ genitalia slide 16159, Holotype no. USNM 72079; in the National Museum of Natural History, Washington, D.C.

HOST: Unknown.

DISTRIBUTION: Known only from the type specimen which was collected near Maracay in the Cordillera de la Costa of northern Venezuela.

DISCUSSION: The large whitish area covering the base of the hindwings easily distinguishes *Lumacra leucobasilaris* from all other

Psychidae and has suggested its specific name, of Greek derivation: (leuco, white; basilaris, at the base). The species most resembling *L. leucobasilaris*, at least with regard to genitalia, appears to be *L. hyalinacra* Davis, which is known only from El Salvador. The two may be easily separated by the above hindwing character with that of *L. hyalinacra* being entirely fuscous. In addition, the vinculum of *L. leucobasilaris* is more attenuated than that of *L. hyalinacra*. The general similarity of the genitalia places *L. leucobasilaris* and *hyalinacra* in the same species group (the *quadridentata* group) along with *L. quadridentata* Davis, a species ranging from Venezuela to French Guiana.

The venational pattern within the genus *Lumacra* demonstrates minor variations among the various species. Usually these involve the relative position of the subcostal crossveins in the hindwing or the degree of separation or fusion of the major veins. Likewise, *L. leucobasilaris* exhibits minor differences from the type of the genus, *L. brasiliensis* (Heylaerts). For example, the base of the medial vein in *L. leucobasilaris* is undivided within the cell of both wings, and the position of the crossvein between 7 and 8 (Sc + R1 and Rs) of the hindwing is beyond the apex of the cell (as in *L. quadridentata*). Such variations appear to have no significance in most instances other than being specific in nature.

REFERENCES

- Davis, D. R. 1964. Bagworm moths of the Western Hemisphere. United States Nat. Mus. Bull. 244, 233 pp., 385 figs.
- Jones, F. M. 1926. A new psychid (Lepidoptera, Psychidae) from South America. Trans. Entomol. Soc. London, pp. 509-511, 1 pl.